# RTD UPDATES: Farm Chemical Use

***Data updates from the Resources and Technology Division***

Economic Research Service
U.S. Department of Agriculture

March 1994
Number 2

## Chemical Use on Oranges and Water Quality Risk

- **Pest scouting to determine the need for pesticide treatments, a fundamental element of Integrated Pest Management programs, occurred on most surveyed orange acreage in the three states.**

- **Soil nutrient testing took place on 70 percent or more of surveyed orange acreage in Florida; in California/Arizona, leaf testing for nutrients was relatively more common.**

- **The most widespread potential risk to water quality from surveyed farms comes from applied chemicals which may dissolve in runoff and be carried to nearby lakes and streams.**

This issue of RTD Updates summarizes findings on orange production practices related to pest control and nutrient management from the 1991 Fruit Chemical Use Survey. It reports field level practices for a sample of approximately 300 orange growers in Arizona, California and Florida, and links these practices to soils characteristics to assess the potential risks to water quality. The Fruit Chemical Use Survey is part of the USDA Pesticide Data Program, a cooperative effort between several USDA agencies, EPA and FDA to produce statistically reliable information on pesticide use.

Scouting and nutrient management, key practices which can reduce the risks of agricultural chemical use to water quality and human and environmental health, are already adopted on a majority of surveyed orange acreage. Other alternatives, such as the release of beneficial insects, are less widely adopted. The survey shows potential for further adoption of other chemical-reducing practices.

Pesticide applicator labor hours are a measure of the potential human health risks which can arise from direct exposure to pesticides on the farm. Among surveyed farms in California/Arizona, about half of the total hours worked by pesticide applicators were on farms using high amounts of Class I (most toxic) pesticides, compared to 28 percent on farms using no Class I pesticides.

Combined chemical and soil properties determine the risks to water quality from chemical use. Survey results indicate little potential risk for chemicals applied on orange acreage to leach into groundwater, with only 7 percent of surveyed farms falling into the highest risk category. Surface water is at higher risk, with 23 and 44 percent, respectively, of surveyed farms in the highest risk categories for chemicals to attach to eroding soil particles and dissolve in runoff.

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### About RTD UPDATES

**RTD UPDATES** is a semimonthly series featuring data relating to agricultural resources, the environment, food safety, and technology. These **UPDATES** report recent data from surveys of farm operators and others knowledgeable about changing agricultural resource conditions, with only minimal interpretation or analysis. Please contact the individual listed at the end of the text for additional information about the data in this **UPDATE**. If you would like to be added to the mailing list or have other questions about **RTD UPDATES**, contact Richard Magleby, (202) 219-0436.

**Scouting use by surveyed orange growers**

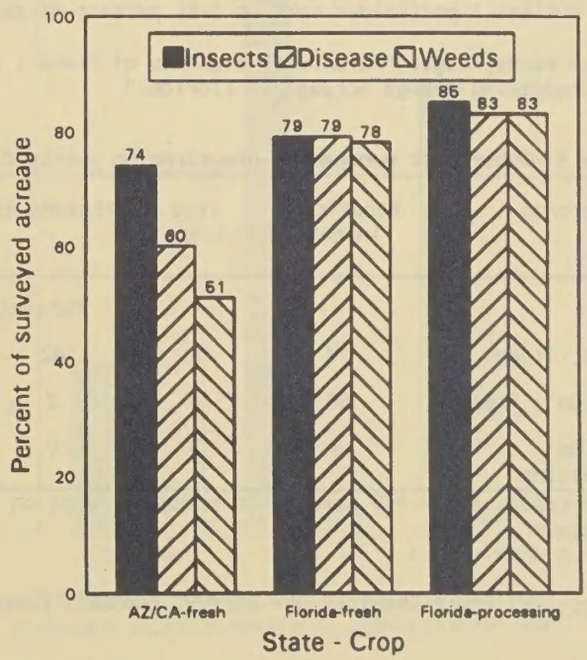

**Table 1--Pesticide active ingredients applied to surveyed orange acreage, by toxicity class, 1991***

| Class I pesticides | Class II pesticides | Class III pesticides |
|---|---|---|
| 2,4-D | Abamectin | Benomyl |
| Aldicarb | Basic copper sulfate | Bromacil |
| Azinphos-methyl | Captafol | Copper ammonium complex |
| Chloropicrin | Carbaryl | Cryolite |
| Copper hydroxide | Chlorophacinone | EPTC |
| Copper sulfate | Chlorpyrifos | Ferbam |
| Cyfluthrin | Diazinon | Gibberellic acid |
| Diphacinone | Dicofol | Malathion |
| Fenamiphos | Dimethoate | Metaldehyde |
| Fenbutatin-oxide | Diquat | Metam-sodium |
| Fluazifop-P-butyl | Diuron | MSMA |
| Formetanate hydrochloride | Ethion | NAA |
| Fosetyl-al | Fenpropathrin | Napropamide |
| Metalaxyl | Fluvalinate | Norflurazon |
| Methidathion | Glyphosate | Oryzalin |
| Methomyl | Methiocarb | Oxydemeton-methyl |
| Methyl bromide | Oxyflourfen | Piperonyl butoxide |
| Mevinphos | Oxythioquinox | Pyrethrins |
| Naled | Pendimethalin | Ryania |
| Paraquat | Phosmet | Sabadilla |
| Propargite | | Sethoxydim |
| Strychnine | | Simazine |
| | | Sulfur |
| | | Trifluralin |

Pesticide active ingredients are classified by EPA into four toxicity categories, according to their acute toxic affects, from most acutely toxic (Class I) to least toxic (Class IV). Source: Farm Chemicals Handbook '91, Mesiter Publishing Company, Willoughby, OH.

* Three pesticide active ingredients used on oranges, Copper oxychloride sulfate, Phytophthora palmivora, and Potassium salts, are either exempt from residue tolerance or lacking mammalian toxicity. One pesticide, Petroleum Distillate, was ranked as a Class IV chemical.

**Table 2--Surveyed orange acreage and pesticide applicator labor hours, by use of Toxicity Class I pesticides, 1991**

| State/crop | High use | Low use | No use | High use | Low use | No use |
|---|---|---|---|---|---|---|
| | Percent of surveyed acreage | | | Percent of applicator hours | | |
| Florida - fresh | 2 | 96 | 3 | * | 99 | 1 |
| Florida - processing | 12 | 64 | 23 | 12 | 78 | 11 |
| AZ/CA - fresh | 52 | 28 | 20 | 52 | 20 | 28 |

* Less than 1 percent; high use = Class I pesticides make up more than 24 percent of total lbs. of a.i. applied; low use = Class I pesticides make up 1-24 percent of total lbs. of a.i. applied; no use = no Class I pesticides applied.

Table reads, e.g.: "Farms with high use of Class I pesticides account for 12 percent of all pesticide applicator hours on processing orange acreage in Florida."

**Table 3--Other pest management practices on surveyed orange acreage, 1991**

| State/crop | Beneficial insects | Trap crops | Pheromones | Pruning/ canopy mgmt. | Debris removal | Reduced pesticide use | Irriga- tion | Tillage/ mowing | Pest resistant varieties |
|---|---|---|---|---|---|---|---|---|---|
| | Percent of surveyed acreage | | | | | | | | |
| AZ/CA - fresh | 19 | 8 | 62 | 50 | 59 | 45 | 17 | 28 | 16 |
| Florida - fresh | 58 | 0 | 2 | 29 | 66 | 88 | 6 | 84 | 12 |
| Florida - processing | 4 | 3 | 0 | 22 | 39 | 20 | 20 | 65 | 9 |

Table reads, e.g.: "19 percent of orange acreage on surveyed farms in California and Arizona was treated with beneficial insects."

Source: 1991 Fruit Chemical Use Survey, Economic Research Service and National Agricultural Statistics Service, USDA

**Table 4--Scouting use and pesticide application decision factors for oranges, 1991**

| Item | Arizona/California-fresh | | Florida-fresh | | Florida-processing | |
|---|---|---|---|---|---|---|
| | Scouted | Not scouted | Scouted | Not scouted | Scouted | Not scouted |
| | Percent of surveyed acreage | | | | | |
| Use of scouting | 69 | 31 | 81 | 19 | 87 | 13 |
| Application decision factor: | Percent of scouted/not scouted acreage | | | | | |
| Predetermined schedule | 1 | 13 | 0 | 0 | 3 | 7 |
| Scouting reports | 90 | 1* | 95 | 0 | 95 | 1* |
| Other | 9 | 86 | 5 | 100 | 2 | 92 |

Table reads, e.g.: "69% of orange acreage on surveyed farms in California and Arizona was scouted. Scouting reports were the most important factor in deciding when to apply pesticides on 90% of this acreage."
*Growers who did not report scouting their fields may rely on a neighbor who scouts or on local reports provided by extension.

**Table 5--Characteristics of surveyed orange growers by use of scouting, 1991**

| Characteristic | Arizona/California-fresh | | Florida-fresh | | Florida-processing | |
|---|---|---|---|---|---|---|
| | Scouted | Not scouted | Scouted | Not scouted | Scouted | Not scouted |
| | Percent of surveyed growers | | | | | |
| Some college education | 83 | 61 | 73 | 83 | 82 | 67 |
| Income over $100,000 | 73 | 81 | 18 | 50 | 29 | 67 |
| Certified restricted pesticide applicator | 50 | 34 | 64 | 50 | 39 | 67 |
| Average age of operator | 54 | 52 | 47 | 56 | 52 | 57 |
| Average years of experience | 25 | 21 | 18 | 29 | 24 | 29 |

Table reads, e.g.: "73% of surveyed growers in California and Arizona who used scouting had gross farm sales of more than $100,000."

Percent of fruit acres on surveyed orange farms to which pesticides or fertilizers are applied through irrigation water

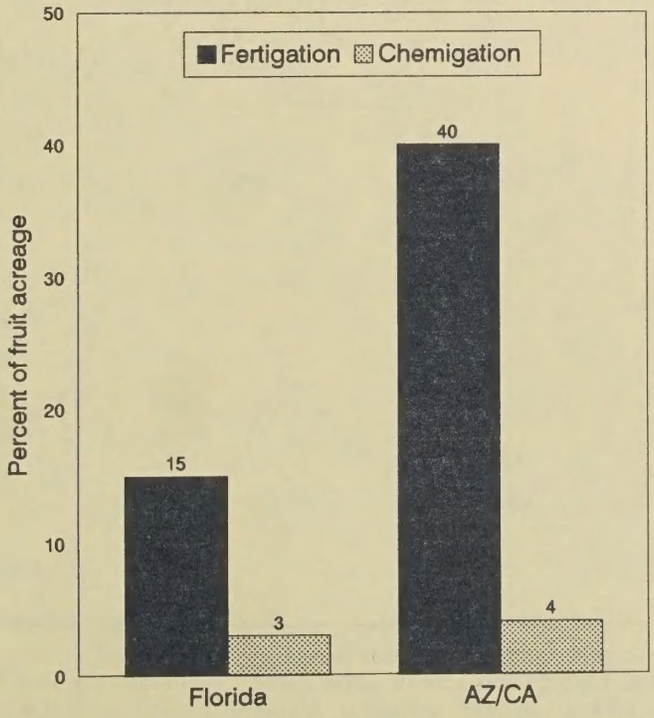


Chart reads, e.g: "Surveyed orange growers in Florida fertigated 15% of their fruit acreage."

Nutrient management practices used on surveyed orange acreage

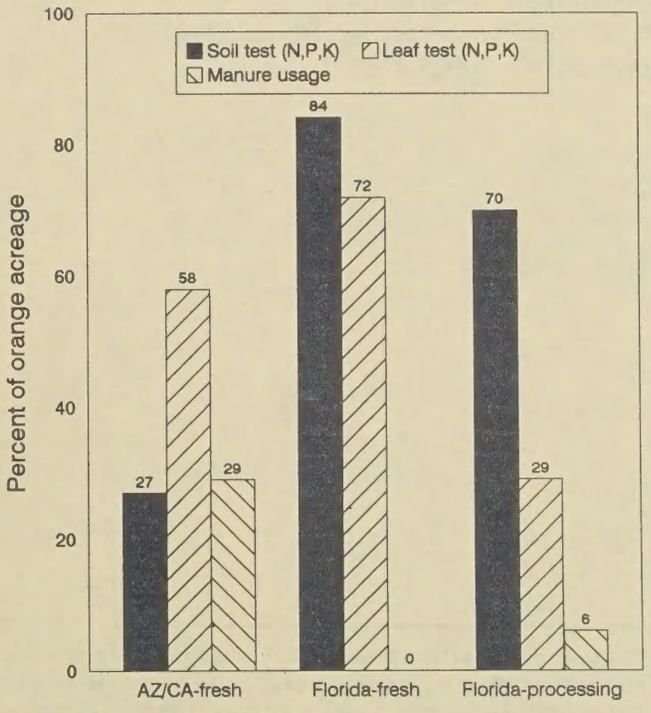


Chart reads, e.g: "Soil testing was performed on 27 percent of orange acreage on surveyed farms in California and Arizona"

Distribution of potential water quality risk
from pesticide use on surveyed orange acreage

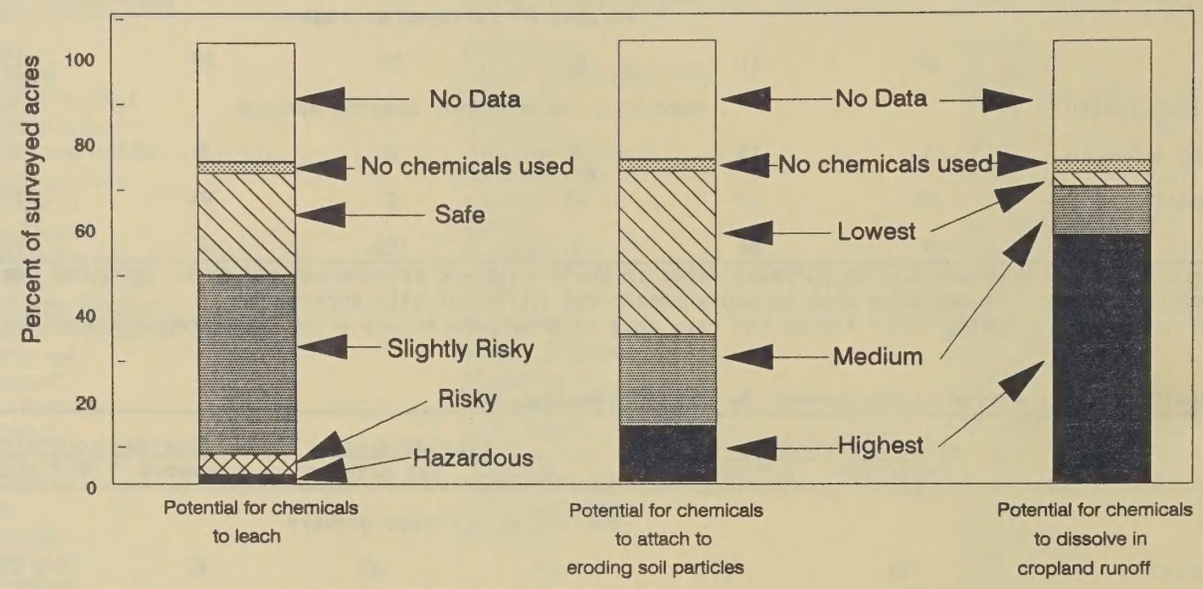


Chart reads, e.g., "More surveyed acreage was at highest risk for chemicals to dissolve in cropland runoff than for chemicals to attach to eroding soil particles." "Safe" or "Lowest" risk levels indicate a low or negligible probability of chemical contamination, while "Hazardous" or "Risky" cropland is most susceptible to water pollution from pesticide use on oranges.

Source: 1991 Fruit Chemical Use Survey, Economic Research Service and National Agricultural Statistics Service, USDA

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